Forest Roads, Drainage, and Sediment Delivery in the Kilchis River Watershed

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EXECUTIVE SUMMARY

This report describes the forest road system in the Kilchis River watershed. This inventory was generally conducted prior to major storms in 1995–96. The objective of this study was to determine the relative potential for forest roads to deliver sediment to the watershed. Roads were then reinspected to identify landslides and washouts. The study was designed for use in a watershed analysis of sediment delivery for the forested portions of the Kilchis River watershed.

Because of the significant alteration to slopes and channels, roads, rather than timber management, are the primary source of sediment from forest management activities in the west (Megahan and Ketcheson 1996). There are two ways to mitigate sediment delivery to streams: (1) reduce the volume of erosion through on-site control practices; and (2) reduce sediment delivery by increasing sediment retention on the hillside (Megahan and Ketcheson 1996).

Because of the high potential for sediment delivery to streams, many forestry best management practices deal with road construction and maintenance. A "best management practice" is a practice or combination of practices that, after problem assessment, examination of alternative practices, and public participation is determined to be the most effective and practicable means of preventing or reducing nonpoint source pollution to a level compatible with water quality goals. The State of Oregon regulates forest road construction and maintenance through the forest practice rules.

Research conducted over the last 40 years in the Pacific Northwest has investigated ditch erosion, condition of drainage structures, surface erosion, hillslope erosion, landslides, sediment travel and delivery, turbidity, and sediment budgets as related to forest roads. Over the period of this research, there have been major changes in accepted road management practices, and also major differences in year to year climate. Geology and soils also vary tremendously around the region. Therefore, quantitative results of any one study may have only very limited applicability to roads in the Kilchis River watershed.

Most of the forest roads in the basin were constructed between about 1920 (old railroad grades) and 1970. Roads have also been constructed over the past twenty years in the lower third (unburned) portions of the basin. A large but unknown percent of the old roads have been abandoned, and are no longer driveable or easily identified as roads.

Every "official" forest road (those used for forest management purposes since 1972) in the Kilchis watershed, or with drainage directed to the Kilchis watershed, was driven or walked to collect the necessary data. The field survey gathered information on: (1) general road characteristics; (2) the condition of surveyed roads in locations where sediment is generated (between discharge locations); and (3) specific locations of surface water discharges, including potential for sediment delivery to waters.

This survey evaluated 106.7 miles (172 km) of forest roads in the Kilchis River watershed. Twenty five percent of road segment length in the basin clearly delivered (flow and any sediment carried by the flow) to streams, while an additional 14% were given a possible delivery rating; a total of up to 39% possible delivery to channels.

A total of 57 landslides associated with the storms of 1995 and 1996 were identified. Forty-eight of the road- or landing-associated landslides that occurred during the winter of 1995–96 in the Kilchis watershed involved more than 10 yd^3 of material. In addition, there were 22 washouts which eroded > 10 yd^3 of

material. There were at least another 28 washouts of <10 yd^3 volume.

The percentage of the road system delivering sediments to streams in the Kilchis watershed (between 25 and 39%) was lower than the 57.3% reported by Wemple (1994) or the 75% reported by Reid and Dunne (1984). It was comparable with the 34% reported by Bilby *et al.* (1989). It was exactly the same as the western Oregon random survey (ODF 1996). Average segment lengths from stream crossings to the first cross drainages above the stream crossings was 436 ft (133 m), while average spacing for the entire road system was 381 ft (116 m). This suggests that roads are designed and maintained for efficient delivery of water to channels. This is in contrast to the current forest practices rules, which require filtering of muddy runoff water through the forest floor.

At the present time, the two principal surface erosion concerns in the Kilchis basin are:

1. excessive length of ditches routed to deliver sediment directly to channels, and

2. steep gradient roads (≥13%) with excessively spaced cross-drainage structures.

Landslides and washouts are clearly the dominant erosional processes associated with forest roads in the Kilchis watershed, especially in years when there are major storms. Analysis of the road-related landslides data will be conducted with the historical landslides analysis of the Kilchis watershed, and will be compared with the Wilson River Storm of 1996 monitoring study site, as well.

As part of this study and a similar study conducted over all of western Oregon, a road inventories protocol was developed for forest land managers use and to provide information needed in order to prioritize road management decisions, especially maintenance and repair activities. It is intended for priority use in areas where roads pose higher risks to anadromous fish and their habitats. This report also includes several specific recommendations for road managers in the Kilchis watershed.